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ACCIDENTS AT METALLURGICAL WORKS IN THE UNITED STATES

DURING THE CALENDAR YEAR 1923

BY

WILLIAM W. ADAMS

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ACCIDENTS AT METALLURGICAL WORKS IN THE UNITED STATES DURING THE CALENDAR YEAR 1923

By WILLIAM W. ADAMS

INTRODUCTION

Reports from companies that operated ore-dressing plants and smelters [1] in 1923 indicate that the volume of work done by the industry continued to increase from the low record of 1921. At ore-dressing plants the number of man-shifts of work reported was 92 per cent above 1921, 40 per cent above 1922, and only 8 per cent below 1920. The reports for smelting plants showed an increase of 88 per cent in number of shifts worked as compared with 1921 and an increase of 28 per cent as compared with 1922; the number was within 12 per cent of the number of shifts worked in 1920. The average working time at ore-dressing plants was 300 days per man, at smelters 357 days. The figure for ore dressing has not been exceeded since the war-year 1918, when the average operating time was 310 days per man; the figure for smelting plants is the highest on record. The nearest approach to the record for smelters in 1923 was that of 1913, when the record was 355 work days per man. The increase in volume of work was general throughout the country and was shared by nearly all States.

The reports showed a total of 54,418 men employed during 1923 at ore-dressing plants, smelters, and auxiliary works; the men performed 18,047,774 days of labor, an average of 332 days per man. The number of shifts worked was 4,245,456 in excess of the number reported for 1922.

Accidents during the year killed 58 men and injured 8,476, indicating a fatality rate of 0.96 and an injury rate of 141 per thousand full-time (300-day) workers. For 1922 the corresponding rates were 0.98 and 145, respectively. The accident rates for 1923 may be segregated as follows: For mills, the rates per thousand full-time workers were 1.55 killed and 168 injured; for smelters, 0.64 killed and 131 injured; for auxiliary work, 0.94 killed and 132 injured.

[1] Iron blast-furnaces excluded.

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Of the 8,534 accidents during the year, 0.68 per cent were fatal, 0.01 per cent resulted in permanent total disability, 1.91 per cent resulted in permanent partial disability, 26.42 per cent caused temporary disability for more than 14 days, and 70.98 per cent caused temporary disability for more than the remainder of the shift but not exceeding 14 days.

Table 1 shows the number of men employed and the number of accidents in the metallurgical industry for each year since 1913, the first year for which figures are available.

ACKNOWLEDGMENTS

The Bureau of Mines gratefully acknowledges the cooperation of owners and operators of metallurgical plants and of others interested in the metallurgical industry whose voluntary reports of accidents at their properties furnished the basis of the statistical tables herein presented.

Data for California were furnished by the industrial accident commission of that State. For assistance in the compilation of the various tables credit is due Miss L. S. Gerry and Miss E. V. Walters, of the Bureau of Mines.

SCOPE OF STATISTICS

The tables in this paper have been compiled by the Bureau of Mines from reports furnished directly (except in California) by operators of ore-dressing plants and smelters. The data for California were furnished by the industrial accident commission of that State. The statistics represent the entire metallurgical industry, except iron blast-furnace plants, accident reports for those not being received by the Bureau of Mines. The figures for smelting plants cover copper, lead, gold, and silver smelters and refineries; those for ore-dressing plants represent concentrating plants for copper ores, lead ores, and zinc ores, stamp mills, cyanide plants, iron-ore washers, flotation mills, and sampling works.

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TABLE 1.—*Summary of labor and accidents at metallurgical plants*

	Men employed		Days of labor performed	Average days active	Total number killed	Number killed per 1,000 300-day workers	Total number injured	Number injured per 1,000 300-day workers
	Actual number	300-day workers						
Ore-dressing plants:								
1913	14,985	16,154	4,846,338	323	16	0.99	1,977	122.38
1914	15,128	15,225	4,567,529	302	23	1.51	1,434	94.19
1915	18,564	19,107	5,732,184	309	30	1.57	2,095	109.65
1916 [1]	22,365	23,470	7,041,083	315	33	1.41	3,184	135.66
1917 [1]	24,111	24,372	7,311,499	303	47	1.93	2,952	121.12
1918 [1]	21,809	22,517	6,754,962	310	35	1.55	3,142	139.54
1919 [1]	17,262	16,862	5,058,545	293	25	1.48	2,057	122.21
1920 [1]	16,827	16,813	5,043,911	300	21	1.25	2,624	156.07
1921 [1]	10,047	8,037	2,411,148	240	4	.50	1,214	151.05
1922 [1]	11,676	11,052	3,315,471	284	12	1.09	1,984	179.51
1923 [1]	15,446	15,442	4,632,749	300	24	1.55	2,601	168.44
Smelting plants: [2]								
1913	20,564	24,309	7,292,766	355	47	1.93	4,247	174.71
1914	27,879	32,336	9,700,769	348	33	1.02	5,673	175.44
1915	31,327	36,262	10,878,486	347	38	1.05	5,718	157.69
1916 [1]	43,829	49,363	14,809,046	338	36	.73	9,656	195.61
1917 [1]	44,376	50,659	15,197,643	342	53	1.05	7,745	152.88
1918 [1]	39,899	45,439	13,631,601	342	42	.92	6,743	148.40
1919 [1]	28,777	31,324	9,397,082	327	34	1.09	4,431	141.46
1920 [1]	26,099	30,411	9,123,186	350	20	.66	4,147	136.37
1921 [1]	14,621	14,204	4,261,304	293	14	.99	2,129	149.89
1922 [1]	19,495	20,887	6,266,159	321	16	.77	3,002	143.71
1923 [1]	22,439	26,677	8,003,175	357	17	.64	3,487	130.71
Auxiliary works:								
1913, 1914, 1915 [3]								
1916	14,007	15,763	4,729,010	338	14	.89	2,240	142.10
1917	15,555	17,014	5,104,146	328	16	.94	2,881	169.33
1918	18,044	20,111	6,033,184	334	17	.85	2,808	139.63
1919	15,081	16,172	4,851,726	322	5	.31	1,638	101.29
1920	16,306	18,363	5,508,756	338	20	1.08	2,092	113.92
1921	8,762	8,308	2,492,519	284	9	1.08	1,151	138.54
1922	12,829	14,069	4,220,688	329	17	1.21	1,692	120.26
1923	16,533	18,040	5,411,850	327	17	.94	2,388	132.37

[1] Not including auxiliary works, as shops, yards, etc.
[2] Exclusive of iron blast-furnaces.
[3] Not separately reported.

CLASSIFICATION OF ACCIDENTS

Beginning with 1916 the bureau's statistics of accidents at metallurgical plants have divided all injuries into five main classes, as follows: 1, fatalities; 2, permanent total disabilities; 3, permanent partial disabilities; 4, temporary disabilities lasting more than 14 days; 5, temporary disabilities not exceeding 14 days but more than the remainder of the shift.

During the eight years covered by the table that follows, 78,536 fatal and lost-time accidents at metallurgical plants have been reported to the Bureau of Mines. Of these, 548 (0.70 per cent) were fatal; 36 (0.04 per cent) resulted in permanent total disability; 1,144 (1.46 per cent) resulted in permanent partial disability; 18,537 (23.60 per cent) caused temporary disability for more than 14 days; and 58,271 (74.20 per cent) caused temporary disability for more than the remainder of the shift but not exceeding 14 days. During this period the employees worked more than 160,000,000 man-shifts, so that the volume of exposure to occupational hazards indicates that the foregoing distribution of accidents may be accepted as typical of the severity of accidents among persons engaged in the industry.

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Fatal and nonfatal accidents, 1916–1923

	1916	1917	1918	1919	1920	1921	1922	1923
1. Fatal	83	116	94	64	61	27	45	58
2. Serious (time lost, more than 14 days):								
Permanent disability—								
Total [1]	17	5	7	2	2	0	2	1
Partial [2]	200	202	247	71	147	38	76	163
Others	3,443	3,302	3,028	[3] 1,869	[3] 1,990	[3] 1,025	[3] 1,625	[3] 2,255
3. Slight (time lost, 1 to 14 days, inclusive)	11,420	10,069	9,411	6,184	6,724	3,431	4,975	6,057
Total nonfatal injuries	15,080	13,578	12,693	8,126	8,863	4,494	6,678	8,476
Grand total (fatal and nonfatal)	15,163	13,694	12,787	8,190	8,924	4,521	6,723	8,534
Men employed	80,201	84,042	79,752	61,120	59,232	37,465	44,000	54,418

[1] Permanent total disability: Loss of both legs or arms, one leg and one arm, total loss of eyesight, paralysis, or other condition permanently incapacitating workman from doing any work of a gainful occupation.
[2] Permanent partial disability: Loss of one foot, leg, hand, eye, one or more fingers, one or more toes, any dislocation where ligaments are severed, or any other injury known in surgery to be permanent partial disability.
[3] "Other serious accidents" in 1919 include 50 cases of permanent partial disability; in 1920, 72 cases of permanent partial disability and 1 case of permanent total disability; in 1921, 18 cases of permanent partial disability and 2 cases of permanent total disability; in 1922, 83 cases of permanent partial disability and 2 cases of permanent total disability; and in 1923, 89 cases of permanent partial disability.

ACCIDENTS AT ORE-DRESSING PLANTS

Accidents at ore-dressing plants in 1923 caused the death of 24 men and the injury of 2,601 men, each injury resulting in disability for more than the remainder of the shift. The returns from operating companies indicated that 4,632,749 shifts were worked by the 15,446 men employed during the year, an average of 300 days per man. On a standard of 300 days of work per man per year, the fatality rate was 1.55 and the injury rate 168 per thousand men employed, as compared with 1.09 and 180, respectively, in 1922. For the five years 1918–1922 the fatality rate was 1.29 and the injury rate was 146. Thus the fatality rate for 1923 indicated an upward trend, while the injury rate, though less than that for 1922, was still higher than the rates usually prevailing at ore-dressing plants.

The main causes of accidents during the past year were machinery, hand tools, falls of persons, nails and splinters, falling objects, crushers, rolls or stamps, and haulage.

Of the 2,625 accidents during the year, 24 resulted fatally, 37 caused permanent partial disability, 629 caused temporary disability exceeding 14 days, and 1,935 caused temporary disability exceeding the remainder of the shift but not in excess of 14 days.

For 48 per cent of the men employed in the industry the standard number of hours constituting a day's work was 8; for 7 per cent, 9 hours was the standard day; for 13 per cent, 10 hours. For 32 per cent of the men the reports either did not show the hours per day or they indicated some other basis than those mentioned.

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ACCIDENTS AT SMELTERS

Reports covering smelting plants operated in 1923 showed that accidents during the year resulted in the death of 17 employees and in injury to 3,487 men. The number of men employed at the smelters was 22,439; they worked 8,003,175 shifts, an average of 357 days per man. Accidents among the employees resulted in a fatality rate of 0.64 and an injury rate of 131 per thousand full-time (300-day) workers. For 1922 the fatality rate was 0.77 and the injury rate was 144; and for the five-year period 1918–1922 the fatality rate was 0.89 and the injury rate was 144. These figures indicate a material improvement in the accident experience of the industry in 1923.

The chief causes of accidents in 1923 were burns from matte, slag, or molten metal; flying or falling objects, hand tools, falls of persons, haulage, explosions of hot metal, machinery, and railway cars.

Of the 3,504 accidents during the past year, 17 (0.48 per cent) were fatal, 1 (0.03 per cent) resulted in permanent total disability, 102 (2.91 per cent) resulted in permanent partial disability, 1,013 (28.91 per cent) caused temporary disability lasting more than 14 days, and 2,371 (67.67 per cent) caused temporary disability exceeding the remainder of the shift but not exceeding 14 days.

Of the 22,439 men employed at smelters, 71 per cent were employed on the basis of 8 hours per day, 3 per cent 9 hours per day, 1.4 per cent 12 hours per day, and 24 per cent on all other bases or else the hours per day were not indicated.

ACCIDENTS AT AUXILIARY WORKS

Accidents at auxiliary plants operated in connection with mills and smelters in 1923 were responsible for 17 deaths and 2,388 lost-time injuries. The average number of employees during the year was 16,533 and the aggregate number of shifts worked was 5,411,850, an average of 327 days per man. Based on these figures the fatality rate per thousand full-time or 300-day workers was 0.94 and the injury rate was 132. For 1922 the corresponding rates were 1.21 and 120, and for the five-year period 1918–1922 the average rates were 0.88 and 122.

The main causes of accidents during 1923 were falling objects, hand tools, falls of persons, machinery, nails and splinters, railway cars, and haulage.

Of the 2,405 accidents reported, 17 were fatal, 24 resulted in permanent partial disability, 613 caused temporary disability lasting more than 14 days, and 1,751 caused temporary disability lasting more than the remainder of the shift but not exceeding 14 days.

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Eight hours per day was the standard workday for 47 per cent of the men employed at the auxiliary plants, 9 hours for 18 per cent. The remaining 35 per cent of the men were employed on some other basis or else the hours per day were not indicated on the reports.

METALLURGICAL-PLANT ACCIDENTS, 1919–1923

Table 17 shows the causes and the degree of severity of accidents at metallurgical plants during the five-year period 1919–1923. During this period the average annual number of employees at mills was 14,252, at smelters 22,286, and at auxiliary plants 13,902. The total exposure to hazard at mills was equivalent to 20,461,824 man-days; at smelters 37,050,906 days; and at auxiliary plants 22,485,539 days. The accident rates, including both fatal and nonfatal injuries, were 155 for mills, 140 for smelters, and 120 for auxiliary plants per thousand 300-day workers.

ACCIDENTS AT COPPER MILLS AND SMELTERS

Mills and smelters treating copper ores constitute an important part of the metallurgical industry of the United States and one that is readily segregated.

Table 15 is based upon the reports of 24 copper mills employing 4,766 men in 1923 and 23 copper smelters employing 10,823. The mills are in Alaska, Arizona, New Mexico, Utah, Montana, Nevada, Michigan, and Washington; the smelters are in Arizona, Nevada, Washington, Montana, Michigan, New Jersey, New York, Pennsylvania, Maryland, Virginia, and Tennessee. Fatal and nonfatal injuries at mills resulted in an accident rate of 184 per thousand 300-day workers, as compared with an average 5-year rate of 157 for the period 1918–1922. The rate for copper smelters was 115, as against a 5-year average of 153. The rate for mills in 1922 was 173 and that for smelters was 130.

ACCIDENT RATES BASED ON HOURS OF EXPOSURE

Beginning in 1922 this series of reports presented accident rates for mills and smelters calculated on a uniform number of hours of work performed by the employees. The purpose was twofold; 1, to reveal what difference, if any, existed in the accident-frequency experience of men working different number of hours per day; 2, to make available accident rates that would be comparable with those for other industries.

Table 21 presents, for the year 1923, data showing the number of accidents per million hours of work done by men employed 8, 9, or 10 hours per day. The table further shows the rates for accidents

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according to degree of severity, that is, for fatalities, permanent injuries, and temporary injuries.

In 1923, as in 1922, the 9-hour men employed at mills had the lowest accident-frequency rate, the reports showing 41 accidents per million hours of exposure; for the 8-hour men the rate was 55 per million hours; and for the 10-hour men the rate was 91. These rates are comparable with similar rates for 1922 which were 39, 54, and 115, in the order stated.

For men employed at smelters the rate for 8-hour men was 54 accidents per million hours, while the rate for 9-hour men was 84. For 1922 the corresponding rates were 63 and 101, respectively. The number of men employed at smelters on other than an 8-hour or 9-hour basis was too small to justify the calculation of accident rates.

The following figures show the accident-frequency rates for metallurgical plants for 1922 and 1923 and similar rates for other branches of the mineral industry. All of the rates are based on one million hours of exposure. Accidents causing disability for only the remainder of the shift are not included.

Number of accidents, fatal and nonfatal, per million hours

1922:		1923:	
Ore-dressing plants	61. 82	Ore-dressing plants	60. 56
Smelters	63. 90	Smelters	56. 14
Quarries; dimension stone	46. 97	Quarries; dimension stone	67. 84
Quarries; crushed stone	69. 63	Quarries; crushed stone	78. 68
Coke ovens; by-product	31. 98	Coke ovens; by-product	47. 40
Coke ovens; beehive	39. 04	Coke ovens; beehive	49. 17
Coal mines		Coal mines [1]	95. 80
Metal mines		Metal mines [1]	90. 89
Metal mines [2]	143. 90		

[1] Figures relate to surface and underground accidents at a small number of typical mines, January, June, 1923.

[2] Figures relate to underground and shaft accidents only at all metal mines in the United States.

COMPARISON OF ACCIDENT RATES FOR SMALL PLANTS AND LARGE PLANTS

Table 22 presents, for the second consecutive year, a comparison of the accident-frequency rates for large plants and small plants. In 1923, as in 1922, the larger plants, that is, those employing the most men, generally had fewer accidents in proportion to the number of men employed. The lowest rates for ore-dressing plants, 103 accidents per thousand full-time workers, was for mills employing from 100 to 199 men each, the highest rate (437) was for mills employing from 1 to 9 men each. When all of the ore-dressing plants are grouped in two classes, those employing 100 or more men and those employing less than 100 men, the reports show a combined rate of 143 for the larger plants and 208 for the smaller plants.

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A similar comparison for smelters shows that the lowest accident rate was for the largest plants, those employing 300 or more men, the rate being 96 accidents per thousand full-time workers; the highest rate was 312, and represented the smallest plants, those employing less than 25 men each. The combined rate for all smelters employing 100 or more men each was 124; the combined rate for all smelters employing less than 100 men each was 237.

These figures are in harmony with those published for 1922, in that the accident rates for the larger plants are usually lower than for the smaller plants. The record for 1922 for ore-dressing plants showed a combined rate of 198 for mills employing less than 100 men and a rate of 172 for the larger plants. For smelters the corresponding rates were 225 for the smaller plants and 139 for the larger ones.

The figures for both mills and smelters indicate a net decrease in the accident rates in 1923 as compared with 1922. An analysis of the record shows, further, that the decline should be credited to the larger plants, as there was actually an increase in the rate for the smaller plants, those employing less than 100 men. These facts are shown by the following figures which represent the number of accidents, both fatal and nonfatal, per thousand full-time workers.

Accidents per thousand full-time workers

1922:		1923:	
Ore-dressing plants—		Ore-dressing plants—	
Small	198	Small	208
Large	172	Large	143
Smelters—		Smelters—	
Small	225	Small	237
Large	139	Large	124

STATISTICAL TABLES

The following tables show the classification and the number of accidents at metallurgical works in the United States during the calendar year 1923:

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TABLE 2.—*Number of men employed, number of days worked, and number of men killed and injured at metallurgical plants in the United States during the year ended December 31, 1923*

State	Ore-dressing plants					Smelting plants					Auxiliary works					Widows	Orphans
	Men employed	Shifts	Average days active	Killed	Injured	Men employed	Shifts	Average days active	Killed	Injured	Men employed	Shifts	Average days active	Killed	Injured		
Alabama	102	23,780	233		16						(1)						3
Alaska [2]	1,023	360,661	353	1	91												
Arizona	1,626	549,133	338		310	2,066	739,948	358	1	419	1,565	558,668	357	3	250	1	3
Arkansas	79	22,670	287		14	(1)					(1)						
California [3]	622	199,067	320	1	77	215	62,511	291	1	47	563	195,906	348		25	1	4
Colorado	874	238,254	273	1	90	1,000	353,968	354	2	95	307	107,128	349		38	2	4
Idaho	552	166,919	302		55	(1)					124	39,464	318		10		
Illinois	140	38,214	273		44	1,483	536,751	362	1	280	1,332	468,382	352		135	1	2
Kansas	292	77,436	265		56	(1)					(1)						
Michigan	1,105	332,078	301	2	69	559	167,179	299	1	95	(1)					1	4
Minnesota	515	78,975	153	3	58						39	7,800	200		38	1	3
Missouri	631	180,317	286	1	117	558	198,886	356		119	966	293,797	304	2	175	1	5
Montana	1,183	387,061	327	2	91	1,629	589,444	362	2	128	1,634	577,476	353	5	172	2	6
Nevada	1,085	357,971	330	3	137	(1)					198	71,216	360		44	3	1
New Jersey	458	134,575	294		33	2,108	767,782	364	1	338	1,215	412,966	340	1	163		
New Mexico	475	162,331	342		57	(1)					770	278,705	362	1	277		1
New York	831	220,969	266	3	123	609	191,501	314	1	72	1,250	408,563	327		190	4	10
Oklahoma	615	152,975	249	1	284	1,287	457,755	356		302	249	80,740	324		58		
Oregon	47	8,246	175		3	(1)											
Pennsylvania	71	22,031	310		1	2,451	889,476	363		400	1,909	693,150	363	2	164		
South Dakota	209	69,395	332		14	(1)											
Tennessee	250	71,275	285		48	150	54,555	364		100	716	253,784	354		208		
Texas	312	106,837	342	1	16	(1)					(1)					2	5
Utah [4]	902	304,123	337	4	639	2,264	825,355	365	3	261	630	227,935	362		55	1	2
Vermont	89	25,940	291		69						(1)						
Virginia	271	67,344	249		27	(1)					704	65,301	93		63		
Washington	148	42,826	289		13	(1)					442	157,133	356		4		
West Virginia						579	211,335	365		203	258	94,170	365		53		
Wisconsin	47	12,025	256		10	(1)											
Other States	892	219,321	246	1	39	5,481	1,956,729	357	4	628	1,662	419,566	252	3	266		
Total, 1923	15,446	4,632,749	300	24	2,601	22,439	8,003,175	357	17	3,487	16,533	5,411,850	327	17	2,388	20	53
Total, 1922	11,676	3,315,471	284	12	1,984	19,495	6,266,159	321	16	3,002	12,829	4,220,688	329	17	1,692	25	47

[1] Included in "Other States."
[2] Stamp mills, other than at lode mines, not included.
[3] Figures relating to California, in this and all other tables, were supplied by the Industrial Accident Commission of the State of California, San Francisco, Calif.
[4] Figures relating to Utah, in this and all other tables, were supplied by the Industrial Accident Commission, Salt Lake City, Utah.

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TABLE 3.—***Metallurgical plants:*** *Fatalities, by causes and*

State	Ore-dressing plants[1]															
	Haulage system (cars, motors, etc.)	Railway cars and locomotives	Crushers, rolls, or stamps	Tables, jigs, etc.	Other machinery	Falls of persons	Suffocation in ore bins	Falling objects (rocks, timbers, etc.)	Cyanide or other poisoning	Scalding (steam or water)	Electricity	Hand tools, axes, bars, etc.	Nails, splinters, etc.	Flying pieces of rock from sledging or crushing	Other causes	Total
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Alaska							1									1
Arizona																
California															1	1
Colorado						1										1
Illinois																
Michigan					1	1										2
Minnesota	1	2														3
Missouri						1										1
Montana		1													1	2
Nevada					2		1									3
New Jersey																
New Mexico																
New York	1					1				1						3
Oklahoma											1					1
Pennsylvania																
Texas						1										1
Utah					2										2	4
Other States															1	1
Total, 1923	2	3			5	5	2			1	1				5	24
Total, 1922				1	5	1	2		1	1	1					12

[1] Stamp mills, sampling works, slime plants, lixiviation, leaching, cyanide, and flotation mills.

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States, during the year ended December 31, 1923

Smelting plants [1]														Auxiliary works [2]										
Haulage system (cars, motors, etc.)	Railway cars and locomotives	Cranes	Other machinery	Falls of persons	Suffocation in ore bins	Flying or falling objects (rocks, timber, etc.)	Gas (burns or asphyxiation)	Scalding (steam or water)	Electricity	Hand tools, axes, bars, etc.	Nails, splinters, etc.	Burns from matte, slag, or molten metal (pouring or spilling)	Hot-metal explosion	Other causes	Total	Haulage system (cars, motors, etc.)	Railway cars and locomotives	Falls of persons	Falling objects (rocks, timbers, etc.)	Nails, splinters, etc.	Hand tools, axes, bars, etc.	Electricity	Machinery	Failure of ladder, scaffold, or other support	Handling hot materials	Other causes	Total
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30		31	32	33	34	35	36	37	38	39	40	41	
			1											1	1		1					1				1	3
				1			1						1		1												
														1	2												
				1											1												
				1										1	2	1		2				2				1	2
												1			1	1											5
						1									1							1					1
																	1										1
																						1					2
1	1				1										3												
1			1										2		4							1	1		1		3
2	1		2	3	1	1	1					1	3	2	17	2	3	2				6	1		1	2	17
2	1		1	5		1	1	1	1			2		1	16	4		1	1			3	1	4	1	2	17

[1] Blast, reverberatory, and roasting furnaces, converters, casting department, and refineries.
[2] Yards, shops, construction, etc.

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TABLE 4.—***Metallurgical plants:*** *Injuries, by causes and*

State	Ore-dressing plants [1]															
	Haulage system (cars, motors, etc.)	Railway cars and locomotives	Crushers, rolls, or stamps	Tables, jigs, etc.	Other machinery	Falls of persons	Suffocation in ore bins	Falling objects (rocks, timbers, etc.)	Cyanide or other poisoning	Scalding (steam or water)	Electricity	Hand tools, axes, bars, etc.	Nails, splinters, etc.	Flying pieces of rock from sledging or crushing	Other causes	Total
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Alabama	1			1	1			4					1			
Alaska	21		8		5	12		19				15	3			
Arizona	14	9	27	3	35	35		34	1	1	1	30	15	12	93	
Arkansas	5				2	1		4				2				
California	13	1	10		7	10		12		1	1	5	2	4	11	
Colorado	6		7	2	16	7		7	1		1	15	1	2	25	
Idaho	2		1	1	10	4		6			1	2	3	3	22	
Illinois	1		14		7	4		6		1	1	1	1	1	7	
Kansas	1		1		6	5		1				6	3	7	28	
Michigan	2	1	3		5	9	4	1		1	1	7	1	1	33	
Minnesota	1	2	2	1	2	6		10		2		5	1	1	25	
Missouri	3	2	11	3	13	10	5	3	2		8	12	10	2	33	
Montana	6	2	4	1	14	11		12		3	2	10	8		28	
Nevada	3	1	5		20	32	28	4			3	9	9	1	26	
New Jersey	2		3		4	4		4	1	2		6		1	1	
New Mexico		3		2	4	11	1	13			1	8	2	2	10	
New York	9	2	8	6	17	5		10		1	1	16	5	12	31	
Oklahoma	10		8	20	28	15		25			1	32	13	62	70	
Oregon					1							1			1	
Pennsylvania					1											
South Dakota			1	1				2						1		
Tennessee	1	1	5		11	5		4			1	5	4	5		
Texas	2		3		1	1						2				
Utah	46	68	54	21	66	67		56		9	3	74	164	2		
Vermont					58							3	4	1		
Virginia	3	1	6		2	3		2	1			3	2	2		
Washington					3	3		5				2				
West Virginia																
Wisconsin			2			3		1					1	1		
Other States	3		3		4	3		3		1		6	4	1	11	
Total, 1923	155	93	186	62	343	266	38	248	6	23	26	277	257	124	496	
Total, 1922	116	54	90	63	223	197	5	216	4	27	37	167	105	163	517	

[1] Stamp mills, sampling works, slime plants, lixiviation, leaching, cyanide, and flotation mills.
[2] Blast, reverberatory, and roasting furnaces, converters, casting department, and refineries.
[3] Yards, shops, construction, etc.

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States, during the year ended December 31, 1923

Smelting plants [2]															Auxiliary works [3]											
Haulage system (cars, motors, etc.)	Railway cars and locomotives	Cranes	Other machinery	Falls of persons	Suffocation in ore bins	Flying or falling objects (rocks, timber, etc.)	Gas (burns or asphyxiation)	Scalding (steam or water)	Electricity	Hand tools, axes, bars, etc.	Nails, splinters, etc.	Burns from matte, slag, or molten metal (pouring or spilling)	Hot-metal explosion	Other causes	Total	Haulage system (cars, motors, etc.)	Railway cars and locomotives	Falls of persons	Falling objects (rocks, timbers, etc.)	Nails, splinters, etc.	Hand tools, axes, bars, etc.	Electricity	Machinery	Failure of ladder, scaffold, or other support	Handling hot materials	Other causes	Total
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30		31	32	33	34	35	36	37	38	39	40	41	
26	16	15	32	26	...	77	1	3	8	37	3	80	11	84	419	3	6	33	35	12	35	2	16	5	4	99	250
5	...	...	2	2	...	16	1	...	...	1	...	2	8	10	47	...	...	6	7	1	3	...	2	1	...	5	25
15	...	1	2	8	...	23	3	...	...	10	1	8	3	21	95	4	3	3	6	1	5	...	2	...	1	13	38
																		1	3	2			2			2	10
28	4	...	2	13	...	42	15	1	...	17	2	75	14	67	280	15	1	17	25	4	11	2	8	...	5	47	135
...	4	...	4	10	...	43	...	...	1	13	1	11	2	6	95	...	...	...	...	...	...	...	...	...	...	...	...
																1	4	3	5	1	8	...	1	1	...	14	38
5	...	...	...	3	...	9	2	1	...	6	...	11	...	82	119	12	1	9	21	16	23	7	14	4	4	64	175
8	...	2	1	11	...	35	...	5	1	1	7	13	6	38	128	1	1	10	43	12	10	5	26	4	7	53	172
																		4	8	10	5	...	4	...	7	6	44
13	33	20	16	22	...	71	...	5	1	26	4	53	4	70	338	6	23	18	39	3	16	...	4	3	6	48	163
																13	3	26	30	15	44	7	22	2	13	102	277
4	...	1	2	3	...	17	3	...	...	10	1	15	...	16	72	6	7	24	30	10	20	4	5	...	...	84	190
13	1	...	13	15	...	43	...	3	...	17	11	75	11	100	302	4	...	7	12	6	2	...	1	...	5	21	58
15	3	...	3	26	...	12	5	7	2	24	2	58	16	227	400	...	...	15	29	9	11	2	4	1	6	87	164
5	...	...	...	9	...	13	...	2	1	14	1	23	9	23	100	5	9	25	31	12	33	...	28	5	9	51	208
21	29	5	9	22	...	37	1	2	6	38	41	16	17	17	261	4	8	16	8	6	10	...	1	...	...	2	55
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	4	7	11	11	2	9	...	6	...	2	11	63
																			2		2						4
23	...	...	8	6	...	7	...	2	...	9	...	99	...	49	203	8	1	...	9	...	7	1	1	...	...	26	53
49	12	2	30	67	...	96	8	6	4	70	10	152	27	95	628	5	19	20	41	27	19	8	27	4	4	92	266
230	102	46	124	243	...	541	39	37	24	293	84	691	128	905	3,487	91	97	252	397	144	268	38	174	30	73	824	2,388
206	53	40	121	227	2	459	38	20	13	263	56	568	62	874	3,002	80	29	181	284	87	169	20	152	22	64	604	1,692

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TABLE 5.—***Metallurgical plants:*** *Percentage of fatalities and injuries, by causes, during the year ended December 31, 1923*

Cause of accident	Killed			Injured		
	Number killed	Per cent of group total	Per cent of grand total	Number injured	Per cent of group total	Per cent of grand total
Ore-dressing plants:						
1. Haulage system (cars, motors, etc.)	2	8.33	3.45	155	5.96	1.83
2. Railway cars and locomotives	3	12.50	5.17	93	3.58	1.10
3. Crushers, rolls, or stamps				186	7.15	2.19
4. Tables, jigs, etc				62	2.38	.73
5. Other machinery	5	20.83	8.62	343	13.19	4.05
6. Falls of persons	5	20.83	8.62	266	10.23	3.14
7. Suffocation in ore bins	2	8.33	3.45	38	1.46	.45
8. Falling objects (rocks, timbers, etc.)				248	9.53	2.92
9. Cyanide or other poisoning				6	.23	.07
10. Scalding (steam or water)	1	4.17	1.72	22	.84	.26
11. Electricity	1	4.17	1.72	26	1.00	.31
12. Hands tools, axes, bars, etc				277	10.65	3.27
13. Nails, splinters, etc				257	9.88	3.03
14. Flying pieces of rock from sledging or crushing				124	4.77	1.46
15. Other causes	5	20.83	8.62	498	19.15	5.88
Total	**24**	**100.00**	**41.38**	**2,601**	**100.00**	**30.69**
Smelting plants:						
16. Haulage system (cars, motors, etc.)	2	11.76	3.45	230	6.60	2.71
17. Railway cars and locomotives	1	5.88	1.72	102	2.92	1.20
18. Cranes				46	1.32	.54
19. Other machinery	2	11.76	3.45	124	3.56	1.46
20. Falls of persons	3	17.65	5.17	243	6.97	2.87
21. Suffocation in ore bins	1	5.88	1.72			
22. Flying or falling objects (rocks, timbers, etc.)	1	5.88	1.72	541	15.51	6.38
23. Gas (burns or asphyxiation)	1	5.88	1.72	39	1.12	.46
24. Scalding (steam or water)				37	1.06	.44
25. Electricity				24	.69	.28
26. Hand tools, axes, bars, etc				293	8.40	3.46
27. Nails, splinters etc				84	2.41	.99
28. Burns from matte, slag, or molten metals (pouring or spilling)	1	5.88	1.72	691	19.82	8.15
29. Hot-metal explosions	3	17.65	5.17	128	3.67	1.51
30. Other causes	2	11.76	3.45	905	25.95	10.68
Total	**17**	**100.00**	**29.31**	**3,487**	**100.00**	**41.14**
Auxiliary works:						
31. Haulage system (cars, motors, etc.)	2	11.76	3.45	91	3.81	1.07
32. Railway cars and locomotives	3	17.65	5.17	97	4.06	1.15
33. Falls of persons	2	11.76	3.45	252	10.55	2.97
34. Falling objects (rocks, timbers, etc.)				397	16.62	4.68
35. Nails, splinters, etc				144	6.03	1.70
36. Hand tools, axes, bars, etc				268	11.22	3.16
37. Electricity	6	35.29	10.35	38	1.59	.45
38. Machinery	1	5.88	1.72	174	7.29	2.05
39. Failure of ladder, scaffold, or other support				30	1.26	.36
40. Handling hot materials	1	5.88	1.72	73	3.06	.86
41. Other causes	2	11.76	3.45	824	34.51	9.72
Total	**17**	**100.00**	**29.31**	**2,388**	**100.00**	**28.17**
Grand total	**58**		**100.00**	**8,476**		**100.00**

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TABLE 6.—*Metallurgical plants: Accidents during the year ended December 31, 1923*

State	Ore-dressing plants [1]					Smelting plants [2]					Auxiliary works				
	Killed	Seriously injured. (Time lost, more than 14 days)			Slightly injured. (Time lost, 1 to 14 days)	Killed	Seriously injured. (Time lost, more than 14 days)			Slightly injured. (Time lost, 1 to 14 days)	Killed	Seriously injured. (Time lost, more than 14 days)			Slightly injured. (Time lost, 1 to 14 days)
		Permanent total disability [3]	Permanent partial disability [4]	Others [5]			Permanent total disability [3]	Permanent partial disability [4]	Others [5]			Permanent total disability [3]	Permanent partial disability [4]	Others [5]	
Alabama				5	11										
Alaska	1			32	59										
Arizona				78	232	1		47	113	259	3		6	78	166
Arkansas				1	13										
California	1			31	46	1			13	34				5	20
Colorado	1		4	25	61	2			29	66				6	32
Idaho				25	30									7	3
Illinois			2	11	31	1		21	97	162			10	40	85
Kansas			1	3	52										
Michigan	2			18	51	1			33	62					
Minnesota	3		1	12	45									7	31
Missouri	1			18	99				13	106	2		1	31	143
Montana	2		1	43	47	2			68	60	5			94	78
Nevada	3			44	93									18	26
New Jersey				7	26	1			113	225	1			60	103
New Mexico				8	49						1			34	243
New York	3		2	21	100	1		6	20	46			2	48	140
Oklahoma	1		3	41	240			1	66	235				10	48
Oregon			1	1	1										
Pennsylvania			1					1	84	315	2			43	121
South Dakota				2	12										
Tennessee				13	35				16	84				37	171
Texas	1		1	3	12										
Utah	4		16	178	445	3		3	85	173				15	40
Vermont				2	67										
Virginia			1	4	22								3	21	39
Washington				1	12									1	3
West Virginia									71	132			1	6	46
Wisconsin					10										
Other States	1		3	2	34	4	1	23	192	412	3		1	52	213
Total, 1923	24		37	629	1,935	17	1	102	1,013	2,371	17		24	613	1,751
Total, 1922	12	1	21	404	1,558	16	1	42	804	2,155	17		13	417	1,262

[1] Ore-dressing plants include stamp mills, sampling works, slime plants, lixiviation, leaching, cyanide, and flotation mills.

[2] Smelters include blast, reverabatory, and roasting furnaces; converters; casting department, and refineries.

[3] Permanent total disability: Loss of both legs or arms, one leg and one arm, total loss of eyesight, paralysis, or other condition permanently incapacitating workman from doing any work of a gainful occupation.

[4] Permanent partial disability: Loss of one foot, hand, leg, eye, one or more fingers, one or more toes, any dislocation where ligaments are severed, or any other injury known in surgery to be permanent partial disability.

[5] "Other serious accidents" in 1919 include 50 cases of permanent partial disability; in 1920, 72 cases of permanent partial disability and 1 case of permanent total disability in 1921, 18 cases of permanent partial disability and 2 cases of permanent total disability; in 1922, 83 cases of permanent partial disability and 2 cases of permanent total disability; and in 1923, 89 cases of permanent partial disability.

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TABLE 7.—***Metallurgical plants:*** *Accidents during the year ended December 31, 1923*

Cause	Killed	Temporary			Permanent partial	Permanent total	Total nonfatal	Grand total
		1 to 14 days	More than 14 days	Total				
Ore-dressing plants: [1]								
1. Haulage system (cars and motors, etc)	2	89	66	155			155	157
2. Railway cars and locomotives	3	66	25	91	2		93	96
3. Crushers, rolls, or stamps		111	69	180	6		186	186
4. Tables, jigs, etc		50	12	62			62	62
5. Other machinery	5	238	94	332	11		343	348
6. Falls of persons	5	190	73	263	3		266	271
7. Suffocation in ore bins	2	29	9	38			38	40
8. Falling objects (rocks, timbers, etc.)		174	73	247	1		248	248
9. Cyanide or other poisoning		2	3	5	1		6	6
10. Scalding (steam or water)	1	17	5	22			22	23
11. Electricity	1	15	10	25	1		26	27
12. Hand tools, axes, bars, etc		212	60	272	5		277	277
13. Nails, splinters, etc		229	25	254	3		257	257
14. Flying pieces of rock from sledging or crushing		106	18	124			124	124
15. Other causes	5	407	87	494	4		498	503
Total	**24**	**1,935**	**629**	**2,564**	**37**		**2,601**	**2,625**
Smelting plants: [4]								
16. Haulage system (cars, motors, etc.)	2	119	103	222	7	1	230	232
17. Railway cars and locomotives	1	67	33	100	2		102	103
18. Cranes		22	19	41	5		46	46
19. Other machinery	2	79	43	122	2		124	126
20. Falls of persons	3	170	71	241	2		243	246
21. Suffocation in ore bins	1							1
22. Flying or falling objects (rocks, timbers, etc.)	1	382	150	532	9		541	542
23. Gas (burns or asphyxiation)	1	24	13	37	2		39	40
24. Scalding (steam or water)		21	16	37			37	37
25. Electricity		18	5	23	1		24	24
26. Hand tools, axes, bars, etc		197	85	282	11		293	293
27. Nails, splinters, etc		67	17	84			84	84
28. Burns from matte, slag, or molten metal (pouring or spilling)	1	437	211	648	43		691	692
29. Hot-metal explosions	3	79	42	121	7		128	131
30. Other causes	2	689	205	894	11		905	907
Total	**17**	**2,371**	**1,013**	**3,384**	**102**	**1**	**3,487**	**3,504**
Auxiliary works:								
31. Haulage system (cars and motors, etc.)	2	55	30	85	6		91	93
32. Railway cars and locomotives	3	69	27	96	1		97	100
33. Falls of persons	2	169	83	252			252	254
34. Falling objects (rocks, timbers, etc.)		273	121	394	3		397	397
35. Nails and splinters, etc		130	14	144			144	144
36. Hand tools, axes, bars, etc		221	46	267	1		268	268
37. Electricity	6	24	14	38			38	44
38. Machinery	1	104	66	170	4		174	175
39. Failure of ladder, scaffold, or other support		14	15	29	1		30	30
40. Handling hot materials	1	48	25	73			73	74
41. Other causes	2	644	172	816	8		824	826
Total	**17**	**1,751**	**613**	**2,364**	**24**		**2,388**	**2,405**
Grand total	**58**	**6,057**	**2,255**	**8,312**	**163**	**1**	**8,476**	**8,534**

[1] Permanent total disability: Loss of both legs or arms, one leg and one arm, total loss of eyesight, paralysis, or other condition permanently incapacitating workman from doing any work of a gainful occupation.
Permanent partial disability: Loss of one foot, leg, hand, eye, one or more fingers, one or more toes, any dislocation where ligaments are severed, or any other injury known in surgery to be permanent partial disability.

[3] Ore-dressing plants include stamp mills, sampling works, slime plants, lixiviation, leaching, cyanide, and flotation mills.

[4] Smelters include blast, reverberatory, and roasting furnaces; converters; casting department; and refineries. (Iron blast furnaces not included.)

Number of wives left widows, 20.

Number of children under 16 years of age left fatherless, 53.

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TABLE 8.—***Ore-dressing plants:*** *Summary of fatalities and injuries, by causes and States, 1916–1923*

	Killed				Injured			
	Total 1916–1920	1921	1922	1923	Total 1916–1920	1921	1922	1923
ACCIDENTS BY CAUSES								
1. Haulage system (cars, motors, etc.)	15	1		2	626	53	116	155
2. Railway cars and locomotives	11			3	211	17	54	93
3. Crushers, rolls, or stamps	6	1			601	70	90	186
4. Tables, jigs, etc	3		1		336	17	63	62
5. Other machinery	48	2	5	5	1,558	130	223	343
6. Falls of persons	23		1	5	1,710	132	197	266
7. Suffocation in ore bins	16		2	2	30	5	5	38
8. Falling objects (rocks, timbers, etc.)	6				1,606	99	216	248
9. Cyanide or other poisoning	2		1		109	4	4	6
10. Scalding (steam or water)	4		1	1	124	22	27	22
11. Electricity	13		1	1	215	24	37	26
12. Hand tools, axes, bars, etc	1				1,335	108	167	277
13. Nails, splinters, etc					746	64	105	257
14. Flying pieces of rock from sledging or crushing					928	73	163	124
15. Other causes	13			5	3,824	396	517	498
Total	**161**	**4**	**12**	**24**	**13,959**	**1,214**	**1,984**	**2,601**
ACCIDENTS BY STATES								
Alabama	3				62		2	16
Alaska	7	1		1	396	12	26	91
Arizona	18		1		2,517	93	244	310
Arkansas	1				66			14
California	7			1	410	66	66	77
Colorado	18		1	1	744	79	61	90
Idaho	1	1			277	26	37	55
Illinois	1				79	5	11	44
Kansas		1			117	61	90	56
Michigan	9			2	559	43	52	69
Minnesota	1			3	159	27	52	58
Missouri	6			1	892	92	76	117
Montana	14		3	2	670	38	84	91
Nevada	17		4	3	624	85	134	137
New Jersey	6				228	27	33	33
New Mexico	9				916	9	21	57
New York	10			3	570	113	69	123
Oklahoma	6		1	1	983	80	291	284
Oregon	1				39	1		3
Pennsylvania					29			1
South Dakota					143	30	28	14
Tennessee	3				171	18	21	48
Utah	14	1	2	4	2,213	110	315	639
Vermont					59	3	58	69
Virginia	2				143	4		27
Washington					41	1	5	13
Wisconsin	4				389	2	7	10
Other States	3			2	463	189	201	55
Total	**161**	**4**	**12**	**24**	**13,959**	**1,214**	**1,984**	**2,601**

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TABLE 9.—***Smelting plants:*** *Summary of fatalities and injuries, by causes and States, 1916–1923*

	Killed				Injured			
	Total 1916–1920	1921	1922	1923	Total 1916–1920	1921	1922	1923
ACCIDENTS BY CAUSES								
16. Haulage system (cars, motors, etc.)	29	2	2	2	2,654	121	206	230
17. Railway cars and locomotives	11		1	1	435	28	53	102
18. Cranes	16				484	32	40	46
19. Other machinery	34	2	1	2	1,539	96	121	124
20. Falls of persons	28	2	5	3	2,442	146	227	243
21. Suffocation in ore bins	3	2		1	85		2	
22. Flying or falling objects (rocks, timbers, etc.)	11	1	1	1	4,938	287	459	541
23. Gas (burns or asphyxiation)	2		1	1	396	15	38	39
24. Scalding (steam or water)	4	1	1		362	20	20	37
25. Electricity	16		1		168	6	13	24
26. Hand tools, axes, bars, etc					2,924	179	263	293
27. Nails, splinters, etc					780	51	56	84
28. Burns from matte, slag, or molten metal (pouring or spilling)	9	1	2	1	6,797	401	568	691
29. Hot-metal explosions	10			3	871	55	62	128
30. Other causes	12	3	1	2	7,847	692	874	905
Total	**185**	**14**	**16**	**17**	**32,722**	**2,129**	**3,002**	**3,487**
ACCIDENTS BY STATES								
Arizona	28	2	1	1	5,111	152	351	419
Arkansas	3				439	39		
California	7			1	860	33	44	47
Colorado	10	1	1	2	1,445	33	74	95
Illinois	11		2	1	3,582	177	171	280
Kansas	7				1,401			
Michigan	2		1	1	678	72	103	95
Missouri	4				1,934			119
Montana	14	2	3	2	1,111	52	97	128
Nevada	6		1		499	30	74	
New Jersey	19	1	4	1	2,796	197	263	338
Oklahoma	9		1		3,000	107	218	302
Pennsylvania	8				2,370	398	489	400
Texas	1				659	18	36	
Utah	28	2		3	1,989	110	171	261
West Virginia	1	2	1		611	91	123	203
Other States	27	4	1	5	4,237	620	797	800
Total	**185**	**14**	**16**	**17**	**32,722**	**2,129**	**3,002**	**3,487**

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TABLE 10.—***Ore-dressing plants:*** *Summary of number killed and injured per 1,000 300-day workers employed, by causes and States, 1916–1923*

	Killed				Injured			
	Total 1916–1920	1921	1922	1923	Total 1916–1920	1921	1922	1923
ACCIDENTS BY CAUSES								
1. Haulage system (cars, motors, etc.)	0.144	0.124	.....	0.129	6.017	6.595	10.496	10.038
2. Railway cars and locomotives	.106	.....	.....	.194	2.028	2.115	4.886	6.022
3. Crushers, rolls, or stamps	.058	.124	.....	.....	5.777	8.710	8.143	12.045
4. Tables, jigs, etc	.029	.....	0.091	.....	3.230	2.115	5.700	4.015
5. Other machinery	.461	.249	.452	.324	14.976	16.175	20.177	22.212
6. Falls of persons	.221	.....	.091	.324	16.437	16.424	17.825	17.226
7. Suffocation in ore bins	.154	.....	.180	.129	.288	.622	.452	2.461
8. Falling objects (rocks, timbers, etc.)	.058	.....	.....	.....	15.437	12.318	19.544	16.060
9. Cyanide or other poisoning	.019	.....	.091	.....	1.048	.498	.362	.288
10. Scalding (steam or water)	.038	.....	.091	.065	1.192	2.737	2.443	1.425
11. Electricity	.125	.....	.091	.065	2.067	2.986	3.348	1.684
12. Hand tools, axes, bars, etc	.010	.....	.....	.....	12.832	13.438	15.110	17.938
13. Nails, splinters, etc	.....	.....	.....	.....	7.171	7.963	9.501	16.643
14. Flying pieces of rock from sledging or crushing	.....	.....	.....	.....	8.920	9.083	14.749	8.030
15. Other causes	.125	.....	.....	.324	36.757	49.272	46.779	32.250
Total	1.548	.498	1.086	1.554	134.177	151.051	179.515	168.437
ACCIDENTS BY STATES								
Alabama	4.815	.....	.....	.....	99.518	.....	74.074	202.532
Alaska	2.370	1.706	.....	.832	134.101	20.478	83.333	75.707
Arizona	1.329	.....	.889	.....	185.770	177.481	216.889	169.399
Arkansas	2.096	.....	.....	.....	138.365	.....	.....	184.211
California	1.694	.....	.....	1.506	99.202	191.304	142.857	115.964
Colorado	2.483	.....	.....	1.259	102.635	124.606	97.134	113.350
Idaho	.382	3.155	1.592	.....	105.766	82.019	102.493	98.921
Illinois	1.818	.....	.....	.....	143.636	74.627	161.765	346.457
Kansas	.....	8.264	.....	.....	189.935	504.132	410.959	217.054
Michigan	.887	.....	.....	1.807	55.074	57.410	61.249	62.331
Minnesota	.718	.....	.....	11.407	114.224	194.245	309.524	220.532
Missouri	1.154	.....	.....	1.664	171.505	148.387	130.360	194.676
Montana	1.539	.....	2.655	1.550	73.634	115.854	74.336	70.543
Nevada	2.376	.....	6.390	2.515	87.224	208.845	214.058	114.837
New Jersey	1.910	.....	.....	.....	72.565	72.973	79.710	73.497
New Mexico	.003	.....	.....	.....	203.873	90.909	70.470	105.360
New York	3.308	.....	.....	4.071	188.554	223.320	91.029	166.893
Oklahoma	2.186	.....	1.695	1.961	358.106	416.667	493.220	556.862
Oregon	3.300	.....	.....	.....	128.713	250.000	.....	111.111
Pennsylvania	.....	.....	.....	.....	125.000	.....	.....	13.699
South Dakota	.....	.....	.....	.....	88.986	103.093	101.449	60.606
Tennessee	1.954	.....	.....	.....	111.401	162.162	165.354	201.685
Utah	1.031	1.634	2.685	3.945	162.996	179.739	422.819	630.178
Vermont	.....	.....	.....	.....	82.865	81.081	763.158	802.326
Virginia	.737	.....	.....	.....	52.729	70.175	.....	120.536
Washington	.....	.....	.....	.....	114.525	76.923	71.429	90.909
Wisconsin	3.540	.....	.....	.....	344.248	66.667	118.644	250.000
Other States	1.111	.....	.....	2.736	171.481	218.245	185.939	75.239
Total	1.548	.498	1.086	1.554	134.177	151.051	179.515	168.437

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TABLE 11.—*Smelting plants: Summary of number killed and injured per 1,000 300-day workers employed, by causes and States, 1916–1923*

	Killed				Injured			
	Total 1916–1920	1921	1922	1923	Total 1916–1920	1921	1922	1923
ACCIDENTS, BY CAUSES								
16. Haulage system (cars, motors, etc.)	0.140	0.141	0.095	0.075	12.809	8.519	9.863	8.622
17. Railway cars and locomotives	.053	.....	.048	.038	2.099	1.971	2.538	3.824
18. Cranes	.077	.....	.....	.....	2.336	2.253	1.915	1.724
19. Other machinery	.164	.141	.048	.075	7.428	6.759	5.793	4.648
20. Falls of persons	.135	.141	.240	.112	11.786	10.279	10.868	9.109
21. Suffocation in ore bins	.015	.141	.....	.038	.410	.....	.096	.....
22. Flying or falling objects (rocks, timbers, etc.)	.053	.070	.048	.038	23.833	20.206	21.975	20.280
23. Gas (burns or asphyxiation)	.010	.....	.048	.038	1.911	1.056	1.819	1.462
24. Scalding (steam or water)	.019	.070	.048	.....	1.747	1.408	.958	1.287
25. Electricity	.077	.....	.048	.....	.811	.422	.622	.900
26. Hand tools, axes, bars, etc	.....	.....	.....	.....	14.112	12.602	12.592	10.983
27. Nails, splinters, etc	.....	.....	.....	.....	3.765	3.590	2.681	3.149
28. Burns from matte, slag, or molten metal (pouring or spilling)	.044	.070	.095	.038	32.805	28.231	27.194	25.902
29. Hot-metal explosions	.048	.....	.....	.112	4.204	3.872	2.958	4.798
30. Other causes	.058	.211	.048	.075	37.873	48.719	41.844	33.924
Total	.893	.986	.766	.637	157.929	149.887	143.796	130.712
ACCIDENTS, BY STATES								
Arizona	1.432	3.241	.624	.406	261.379	246.353	218.964	169.911
Arkansas	1.109	.....	.....	.....	162.232	202.073	.....	.....
California	2.002	.....	.....	4.808	245.995	100.000	115.486	225.962
Colorado	.840	1.908	1.253	1.695	121.449	62.977	92.732	80.508
Illinois	.550	.....	1.341	.559	178.948	172.347	114.688	156.512
Kansas	.807	.....	.....	.....	161.424	.....	.....	.....
Michigan	.417	.....	2.353	1.795	141.221	259.928	242.353	170.557
Missouri	.581	.....	.....	.....	281.023	.....	.....	179.487
Montana	1.239	3.610	1.874	1.018	98.336	93.863	60.587	65.140
Nevada	1.046	.....	2.985	.....	86.964	288.462	220.896	.....
New Jersey	.863	.472	1.575	.391	127.068	92.968	103.543	132.063
Oklahoma	.467	.....	.734	.....	155.731	136.306	159.941	197.903
Pennsylvania	.414	.....	.....	.....	122.639	204.522	185.185	134.907
Texas	.190	.....	.....	.....	125.261	31.972	65.693	.....
Utah	1.954	1.461	.....	1.091	138.829	80.351	87.782	94.575
West Virginia	.220	5.208	1.536	.....	134.463	236.979	188.940	288.352
Other States	.985	1.172	.217	.757	154.593	181.712	172.848	122.662
Total	.893	.986	.766	.637	157.929	149.887	143.796	130.712

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TABLE 12.—***Metallurgical plants:*** *Summary of number of men employed (actual number), by States, 1916–1923*

	Ore-dressing plants				Smelting plants			
	Total 1916–1920	1921	1922	1923	Total 1916–1920	1921	1922	1923
Alabama	997	45	48	102				
Alaska	2,562	580	269	1,023				
Arizona	12,290	773	1,052	1,626	16,616	1,628	1,755	2,066
Arkansas	582	(1)		79	2,557	270		(1)
California	3,919	378	428	622	3,172	313	361	215
Colorado	7,356	670	642	874	11,443	513	784	1,000
Idaho	2,711	367	419	552	(1)			(1)
Illinois	606	80	86	140	17,192	950	1,311	1,483
Kansas	836	137	257	292	8,250			(1)
Michigan	9,842	918	983	1,105	4,541	468	496	559
Minnesota	2,262	276	244	515				
Missouri	5,645	628	578	631	6,371			558
Montana	8,782	509	1,043	1,183	10,615	648	1,382	1,629
Nevada	6,363	494	673	1,085	4,818	213	415	(1)
New Jersey	3,039	441	428	458	18,968	1,742	2,192	2,108
New Mexico	4,155	267	367	475	(1)			(1)
New York	3,271	619	864	831	(1)			609
Oklahoma	3,122	353	663	615	17,328	985	1,459	1,287
Oregon	384	28		47	(1)			(1)
Pennsylvania	247			71	16,179	1,659	2,157	2,451
South Dakota	1,452	241	229	209	(1)			(1)
Tennessee	1,723	197	172	250	(1)			150
Texas	(1)			312	4,345	474	452	(1)
Utah	11,508	738	814	902	11,839	1,272	1,714	2,264
Vermont	745	48	79	89	(1)			
Virginia	2,981	112		271	(1)			(1)
Washington	483	26	63	148	(1)			(1)
West Virginia					3,984	358	535	579
Wisconsin	1,248	69	59	47	(1)			(1)
Other States	3,263	1,053	1,216	892	24,762	3,128	4,482	5,481
Total	**102,374**	**10,047**	**11,676**	**15,446**	**182,980**	**14,621**	**19,495**	**22,439**

[1] Included in "Other States."

TABLE 13.—***Metallurgical plants:*** *Summary of full-time, or 300-day workers, by States, 1916–1923*

	Ore-dressing plants				Smelting plants			
	Total 1916–1920	1921	1922	1923	Total 1916–1920	1921	1922	1923
Alabama	623	12	27	79				
Alaska	2,953	586	312	1,202				
Arizona	13,549	524	1,125	1,830	19,554	617	1,603	2,467
Arkansas	477			76	2,706	193		
California	4,133	345	462	664	3,496	330	381	208
Colorado	7,249	634	628	794	11,898	524	798	1,180
Idaho	2,619	317	361	556				
Illinois	550	67	68	127	20,017	1,027	1,491	1,789
Kansas	616	121	219	258	8,679			
Michigan	10,150	749	849	1,107	4,801	277	425	557
Minnesota	1,392	139	168	263				
Missouri	5,201	620	583	601	6,882			663
Montana	9,099	328	1,130	1,290	11,298	554	1,601	1,965
Nevada	7,154	407	626	1,193	5,738	104	335	
New Jersey	3,142	370	414	449	22,004	2,119	2,540	2,559
New Mexico	4,493	99	298	541				
New York	3,023	506	758	737				638
Oklahoma	2,745	192	590	510	19,264	785	1,363	1,526
Oregon	303	4		27				
Pennsylvania	232			73	19,325	1,946	2,592	2,965
South Dakota	1,607	291	276	231				
Tennessee	1,535	111	127	238				182
Texas				356	5,261	563	548	
Utah	13,577	612	745	1,014	14,327	1,369	1,948	2,751
Vermont	712	37	76	87				
Virginia	2,712	57		225				
Washington	358	13	70	143				
West Virginia					4,544	384	651	705
Wisconsin	1,130	30	59	40				
Other States	2,700	866	1,081	731	27,401	3,412	4,611	6,522
Total	**104,034**	**8,037**	**11,052**	**15,442**	**207,195**	**14,204**	**20,887**	**26,677**

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TABLE 14.—***Metallurgical plants:*** *Summary of days of labor performed, by States, 1916–1923*

	Ore-dressing plants				Smelting plants			
	Total 1916–1920	1921	1922	1923	Total 1916–1920	1921	1922	1923
Alabama	187,134	3,594	8,190	23,780				
Alaska	885,906	175,810	93,509	360,661				
Arizona	4,064,248	157,086	337,363	549,133	5,866,040	185,256	480,757	739,948
Arkansas	142,988			22,670	811,785	58,040		
California	1,239,925	103,516	128,687	199,067	1,048,923	98,930	114,399	62,511
Colorado	2,175,028	190,125	188,418	238,254	3,570,055	157,375	239,456	353,968
Idaho	785,525	95,088	108,151	166,919				
Illinois	165,089	20,096	20,493	38,214	6,005,430	307,960	447,263	536,751
Kansas	185,115	36,208	65,770	77,436	2,603,717			
Michigan	3,044,798	224,616	254,585	332,078	1,440,223	83,110	127,618	167,179
Minnesota	417,541	41,623	50,530	78,975				
Missouri	1,560,366	185,891	174,735	180,317	2,064,880			198,886
Montana	2,729,915	98,417	338,866	387,061	3,389,550	166,364	480,392	589,444
Nevada	2,145,829	122,258	187,738	357,971	1,721,598	31,098	100,525	
New Jersey	942,620	111,028	124,251	134,575	6,601,071	635,830	762,060	767,782
New Mexico	1,348,439	29,657	89,534	162,331				
New York	906,555	151,797	227,237	220,969				191,501
Oklahoma	823,514	57,752	176,940	152,975	5,778,852	235,383	408,810	457,755
Oregon	90,788	1,278		8,246				
Pennsylvania	69,386			22,031	5,797,227	583,709	777,465	889,476
South Dakota	481,902	87,413	82,791	69,395				
Tennessee	460,346	33,285	38,188	71,275				54,555
Texas				106,837	1,578,140	168,852	164,469	
Utah	4,072,924	183,705	223,604	304,123	4,297,896	410,655	584,510	825,355
Vermont	213,830	11,189	22,800	25,940				
Virginia	813,878	16,982		67,344				
Washington	107,360	4,065	21,099	42,826				
West Virginia					1,363,050	115,145	195,275	211,335
Wisconsin	339,808	8,981	17,755	12,025				
Other States	809,243	259,688	324,237	219,321	8,220,121	1,023,597	1,383,140	1,956,729
Total	**31,210,000**	**2,411,148**	**3,315,471**	**4,632,749**	**62,158,558**	**4,961,304**	**6,966,159**	**8,003,175**

TABLE 15.—***Metallurgical plants:*** *Summary of average number of days plants were operated, by States, 1916–1923*

	Ore-dressing plants				Smelting plants			
	Total 1916–1920	1921	1922	1923	Total 1916–1920	1921	1922	1923
Alabama	188	80	171	233				
Alaska	346	303	348	353				
Arizona	331	203	321	338	353	114	274	358
Arkansas	246			287	317	215		
California	316	274	324	320	331	316	317	291
Colorado	296	284	293	273	312	307	305	354
Idaho	290	259	258	302				
Illinois	272	251	238	273	349	324	341	362
Kansas	221	264	256	265	316			
Michigan	309	245	259	301	317	178	257	299
Minnesota	185	151	207	153				
Missouri	276	296	302	286	324			356
Montana	311	193	325	327	319	257	348	362
Nevada	337	247	279	330	357	146	242	
New Jersey	310	252	290	294	348	365	348	364
New Mexico	325	111	244	342				
New York	277	245	263	266				314
Oklahoma	264	104	267	249	333	239	280	356
Oregon	236	46		175				
Pennsylvania	281			310	358	352	360	363
South Dakota	332	363	362	332				
Tennessee	267	169	222	285				364
Texas			315	342	363	356	364	
Utah	354	249	275	337	363	323	341	365
Vermont	287	233	289	291				
Virginia	273	152		249				
Washington	222	156	335	289				
West Virginia					342	321	365	365
Wisconsin	272	130	301	256				
Other States	248	247	261	246	332	327	309	357
Total	**305**	**240**	**284**	**300**	**340**	**293**	**321**	**357**

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TABLE 16.—***Metallurgical plants:*** *Summary of percentage of fatalities and injuries, by causes, 1916 to 1923*

Cause of accident	Killed				Injured			
	Total 1916–1920	1921	1922	1923	Total 1916–1920	1921	1922	1923
Ore-dressing plants:								
1. Haulage (cars and motors)	9.32	25.00		8.33	4.48	4.37	5.85	5.96
2. Railway cars or locomotives	6.83			12.50	1.51	1.40	2.72	3.58
3. Crushers, rolls, or stamps	3.73	25.00			4.31	5.77	4.54	7.15
4. Tables, jigs, etc	1.86		8.33		2.41	1.40	3.17	2.38
5. Other machinery	29.81	50.00	41.67	20.83	11.16	10.71	11.24	13.19
6. Falls of persons	14.29		8.33	20.83	12.25	10.87	9.93	10.23
7. Suffocation in ore bins	9.94			8.33	.22	.41	.25	1.46
8. Falling objects (rocks, timber, etc.)	3.73		16.67		11.51	8.15	10.89	9.53
9. Cyanide or other poisoning	1.24		8.33		.78	.33	.20	.23
10. Scalding (steam or water)	2.48		8.33	4.17	.89	1.81	1.36	.84
11. Electricity	8.08		8.33	4.17	1.54	1.98	1.86	1.00
12. Hand tools, axes, bars, etc	.62				9.56	8.90	8.42	10.65
13. Nails, splinters, etc					5.34	5.27	5.29	9.88
14. Flying pieces of rock from sledging or crushing					6.65	6.01	8.22	4.77
15. Other causes	8.07			20.83	27.39	32.62	26.06	19.15
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Smelting plants:								
16. Haulage (cars, motors, etc.)	15.68	14.29	12.50	11.76	8.11	5.68	6.86	6.60
17. Railway cars or locomotives	5.95		6.25	5.88	1.33	1.32	1.76	2.92
18. Cranes	8.65				1.48	1.50	1.33	1.32
19. Other machinery	18.38	14.29	6.25	11.76	4.70	4.51	4.03	3.56
20. Falls of persons	15.13	14.29	31.25	17.65	7.46	6.86	7.56	6.97
21. Suffocation in ore bins	1.62	14.29		5.88	.26		.07	
22. Flying or falling objects (rocks, timbers, etc.)	5.95	7.14	6.25	5.88	15.09	13.48	15.29	15.51
23. Gas (burns or asphyxiation)	1.08		6.25	5.88	1.21	.70	1.27	1.12
24. Scalding (steam or water)	2.16	7.14	6.25		1.11	.94	.67	1.06
25. Electricity	8.65		6.25		.52	.28	.43	.69
26. Hand tools, axes, bars, etc					8.94	8.41	8.76	8.40
27. Nails, splinters, etc					2.38	2.40	1.87	2.41
28. Burns from matte, slag, or molten metal (pouring or spilling)	4.86	7.14	12.50	5.88	20.77	18.84	18.92	19.82
29. Hot-metal explosions	5.40			17.65	2.66	2.58	2.07	3.67
30. Other causes	6.49	21.42	6.25	11.76	23.98	32.50	29.11	25.95
Total		100.00	100.00	100.00	100.00	100.00	100.00	100.00

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TABLE 17.—*Metallurgical-plant accidents, 1919–1923*

Cause	Killed	Permanent disability		Temporary disability [3]	Slight [4]	Total columns 4 and 5	Total columns 2–5	Total fatal and nonfatal
		Total [1]	Partial [2]					
	1	2	3	4	5	6	7	8
Ore-dressing plants:								
1. Haulage system (cars, motors, etc.)	4	----	2	199	361	560	562	566
2. Railway cars and locomotives	5	----	5	58	173	231	236	241
3. Crushers, rolls, or stamps	4	----	17	180	359	539	556	560
4. Tables, jigs, etc	2	1	2	53	187	240	243	245
5. Other machinery	26	----	41	330	897	1,227	1,268	1,294
6. Falls of persons	12	----	8	334	777	1,111	1,119	1,131
7. Suffocation in ore bins	12	----	----	10	47	57	57	69
8. Falling objects (rocks, timbers, etc.)	1	1	8	239	798	1,037	1,046	1,047
9. Cyanide or other poisoning	2	----	1	16	24	40	41	43
10. Scalding (steam or water)	3	----	1	30	96	126	127	130
11. Electricity	6	----	3	40	103	143	146	152
12. Hand tools, axes, bars, etc	----	----	14	167	799	966	980	980
13. Nails, splinters, etc	----	----	7	58	578	636	643	643
14. Flying pieces of rock from sledging or crushing	----	----	11	71	597	668	679	679
15. Other causes	9	1	15	523	2,238	2,761	2,777	2,786
Total	86	3	135	2,308	8,034	10,342	10,480	10,566
Smelting plants:								
16. Haulage system (cars, motors, etc.)	16	2	23	442	678	1,120	1,145	1,161
17. Railway cars and locomotives	2	----	4	119	178	297	301	303
18. Cranes	6	----	12	93	124	217	229	235
19. Other machinery	14	----	31	208	504	712	743	757
20. Falls of persons	17	----	14	395	832	1,227	1,241	1,258
21. Suffocation in ore bins	4	----	----	2	6	8	8	12
22. Flying or falling objects (rocks, timbers, etc.)	8	----	24	643	1,963	2,606	2,630	2,638
23. Gas (burns or asphyxiation)	3	----	2	55	135	190	192	195
24. Scalding (steam or water)	3	----	1	66	96	162	163	166
25. Electricity	4	----	5	23	69	92	97	101
26. Hand tools, axes, bars, etc	----	1	22	340	1,123	1,463	1,486	1,486
27. Nails, splinters, etc	----	----	3	55	290	345	348	348
28. Burns from matte, slag, or molten metal (pouring or spilling)	6	----	84	877	2,555	3,432	3,516	3,522
29. Hot-metal explosions	6	----	15	131	256	387	402	408
30. Other causes	12	----	31	982	3,682	4,664	4,695	4,707
Total	101	3	271	4,431	12,491	16,922	17,196	17,297
Auxiliary works:								
31. Haulage system (cars, motors, etc.)	12	----	11	115	253	368	379	391
32. Railway cars and locomotives	12	1	3	76	168	244	248	260
33. Falls of persons	7	----	3	293	610	903	906	913
34. Falling objects (rocks, timbers, etc.)	4	----	10	371	1,140	1,511	1,521	1,525
35. Nails, splinters, etc	----	----	2	54	451	505	507	507
36. Hand tools, axes, bars, etc	----	----	12	187	849	1,036	1,048	1,048
37. Electricity	12	----	2	37	75	112	114	126
38. Machinery	5	----	17	208	483	691	708	713
39. Failure of ladders, scaffold, or other support	5	----	4	44	64	108	112	117
40. Handling hot materials	2	----	3	73	217	290	293	295
41. Other causes	9	----	22	567	2,536	3,103	3,125	3,134
Total	68	1	89	2,025	6,846	8,871	8,961	9,029
Grand total	255	7	495	8,764	27,371	36,135	36,637	36,892

[1] Permanent total disability. Loss of both legs or arms, one leg and one arm, total loss of eyesight, paralysis, or other conditions permanently incapacitating workman from doing any work of a gainful occupation.
[2] Permanent partial disability. Loss of one foot, leg, hand, eye, one or more fingers, one or more toes, any dislocation where ligaments are severed, or any other injury known in surgery to be permanent partial disability.
[3] Time lost, more than 14 days.
[4] Time lost, 1 to 14 days, inclusive.

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TABLE 18.—***Copper metallurgical plants:*** *Summary of labor and accidents at selected plants, 1916–1923*

MILLS

	1916–1920	1921	1922	1923
Number of plants	133	28	42	24
Men employed	36,598	2,286	3,888	4,766
Number of 300-day workers	41,013	1,450	3,847	5,492
Total days' labor (shifts)	12,304,012	435,069	1,154,186	1,647,722
Average days active	336	190	297	346
Number killed	33	----	1	9
Number injured	4,841	261	666	1,009
Number killed per 1,000 300-day workers	0.80	----	0.26	1.64
Number injured per 1,000 300-day workers	118.04	173.10	173.12	183.72

SMELTERS

Number of plants	106	23	26	23
Men employed	51,863	5,339	7,163	9,183
Number of 300-day workers	56,885	4,490	7,497	10,823
Total days' labor (shifts)	17,065,450	1,346,976	2,248,960	3,246,922
Average days active	329	252	314	354
Number killed	62	8	8	7
Number injured	9,466	611	970	1,240
Number killed per 1,000 300-day workers	1.09	1.78	1.07	0.65
Number injured per 1,000 300-day workers	166.41	136.08	129.39	114.57

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TABLE 19.—*Copper metallurgical plants: Accidents, by causes, at selected plants, 1916 to 1923*

Cause of accident	Mills								Smelters							
	Killed				Injured				Killed				Injured			
	1916–1920	1921	1922	1923	1916–1920	1921	1922	1923	1916–1920	1921	1922	1923	1916–1920	1921	1922	1923
Haulage system (cars, motors, etc.)	5				211	8	53	54	12			1	674	32	74	61
Railway cars and locomotives	1			1	71	3	24	61	2		1		231	16	25	55
Crushers, rolls, or stamps					122	9	23	72								
Tables, jigs, etc	1				135	3	12	24								
Cranes									5				271	20	27	39
Other machinery	16		3	3	568	28	67	110	7			1	426	25	51	61
Falls of persons	3			1	785	37	87	130	7	2	4	2	828	60	90	110
Suffocation in ore bins	4		1	1	13		4	33	1	2			77		1	
Falling objects (rocks, timbers, etc.)	3				775	27	88	73	3	1		1	1,536	127	180	281
Cyanide or other poisoning					47											
Gas (burns or asphyxiation)									1		1		48	1	8	6
Scalding (steam or water)	1		1	1	42	2	13	13	1	1			97	4	5	18
Electricity	1				119	5	20	1	6				76	4	4	16
Hand tools, axes, bars, etc					654	24	74	99					865	55	89	101
Nails, splinters, etc					374	4	48	184					176	16	20	17
Flying pieces of rock from sledging or crushing					130	15	20	13								
Burns from matte, slag, or molten metal									4	1	2	1	1,584	68	133	188
Hot-metal explosions									9			1	223	24	11	41
Other causes	8			2	1,776	86	133	142	4	1			2,408	159	252	246
Total	**43**	**0**	**5**	**9**	**5,822**	**251**	**666**	**1,009**	**62**	**8**	**8**	**7**	**9,520**	**611**	**970**	**1,240**

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TABLE 20.—*Metallurgical plants: Labor and accident data for 1923, classified by length of shift* [1]

MILLS

Length of shift	Men employed		Days of labor performed	Total hours	Average days per man	Average hours per man	Killed	Nonfatal injuries				Total fatal and nonfatal
	Actual number	Equivalent in 300-day workers						Permanent disability		Temporary disability	Slight	Total nonfatal	
								Total	Partial				
8 hours	7,446	7,856	2,356,661	18,853,288	317	253	7	.....	10	258	760	1,028	1,035
9 hours	1,050	983	294,933	2,654,397	281	253	2	.....	.....	12	96	108	110
10 hours	1,999	1,495	448,635	4,486,350	224	224	3	.....	9	57	340	406	409
11 hours	45	42	12,600	138,600	280	308	.....	.....	.....	1	2	3	3
12 hours	155	131	39,172	470,064	253	303	.....	.....	.....	5	49	54	54
All other and not stated	4,751	4,936	1,480,748	.....	312	.....	12	.....	18	296	688	1,002	1,014
Total	15,446	15,443	4,632,749	.....	300	.....	24	.....	37	629	1,935	2,601	2,625

SMELTERS

8 hours	15,866	18,998	5,699,549	45,596,392	359	287	14	1	89	700	1,651	2,441	2,455
9 hours	726	803	240,810	2,167,290	332	299	.....	.....	1	50	132	183	183
10 hours	45	45	13,350	133,500	297	297	.....	.....	.....	3	38	41	41
11 hours	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
12 hours	321	376	112,655	1,351,860	351	421	.....	.....	1	23	62	86	86
All other and not stated	5,481	6,456	1,936,811	.....	353	.....	3	.....	11	237	488	736	739
Total	22,439	26,678	8,003,175	.....	357	.....	17	1	102	1,013	2,371	3,487	3,504

[1] California not included.

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TABLE 21.—*Metallurgical plants: Fatalities and injuries per 1,000,000 hours of exposure, classified by length of shift, during the year ended December 31, 1923*

MILLS

Character of disability	8 hours	9 hours	10 hours
Fatal	0.371	0.753	0.669
Permanent total disability			
Permanent partial disability	.531		2.009
Other serious	13.685	4.521	12.705
Slight	40.311	36.167	75.785
Total injuries	**54.527**	**40.688**	**90.496**
Total fatalities and injuries	**54.898**	**41.441**	**91.165**

SMELTERS

Fatal	0.307		
Permanent total disability	.022		
Permanent partial disability	1.952	0.461	
Other serious	15.352	23.070	
Slight	36.209	60.906	
Total injuries	**53.535**	**84.437**	
Total fatalities and injuries	**53.842**	**84.437**	

TABLE 22.—*Metallurgical plants: Accident data for 1923, based on size of plant*[1]

MILLS

Men employed	Number of plants	Men employed: Actual number	Men employed: Equivalent in 300-day workers	Days of labor performed	Average days active	Killed	Injured	Killed per 1,000 300-day workers	Injured per 1,000 300-day workers
1–9	156	810	552	165,530	204		241		436.59
10–14	55	643	523	156,771	244	4	137	7.65	261.93
15–24	57	1,033	870	260,928	253		281		322.99
25–49	73	2,445	2,116	634,862	260	4	398	1.89	188.09
50–99	38	2,548	2,575	772,415	303	5	312	1.94	121.17
100–199	20	2,723	2,966	889,901	327	3	302	1.01	101.82
200–299	5	1,218	1,392	417,722	343	1	162	.72	116.38
300 and over	9	3,404	3,785	1,135,553	334	6	691	1.59	182.56
Total	**413**	**14,824**	**14,779**	**4,433,682**	**299**	**23**	**2,524**	**1.56**	**170.78**

SMELTERS

1–24	21	160	138	41,319	158		43		311.59
25–49	8	395	326	97,779	321	1	71	3.07	217.79
50–99	13	904	1,042	312,524	346	1	241	.96	231.29
100–199	23	3,462	4,049	1,214,892	351		902		222.72
200–299	11	2,589	3,140	941,985	364	2	485	.64	154.46
300 and over	24	14,804	17,774	5,332,165	360	12	1,698	.68	95.55
Total	**100**	**22,224**	**26,469**	**7,940,664**	**357**	**16**	**3,440**	**.60**	**129.96**

[1] California not included.

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TABLE 23.—*United States: Number of men killed per 1,000 300-day workers employed in mineral industries*

	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923
Coal mines	4.97	4.46	4.70	4.66	4.44	3.93	4.25	3.94	4.27	3.78	4.19	4.89	4.38
All metal mines	4.45	4.09	3.72	3.92	3.89	3.62	4.44	3.57	3.47	3.16	3.09	3.54	2.90
Copper mines	5.18	4.53	4.08	3.85	3.72	3.64	5.88	3.45	3.54	3.43	3.70	3.00	3.11
Gold and miscellaneous metal mines	4.28	4.32	3.83	4.06	4.79	4.05	4.03	4.27	4.41	4.20	3.29	5.35	3.93
Iron mines	4.64	3.96	3.29	3.78	2.88	3.41	3.54	3.45	3.09	2.34	3.04	3.00	2.11
Lead and zinc mines (Mississippi Valley)	4.03	4.28	3.90	4.32	5.37	3.14	4.09	3.58	4.13	3.27	2.58	2.64	2.73
Nonmetallic mineral mines	2.01	1.66	3.02	3.72	2.43	3.00	2.48	1.67	1.65	2.89	1.98	2.39	2.67
All quarries (including outside works)	2.23	2.27	2.10	2.64	1.80	2.26	1.83	2.11	1.93	2.31	2.00	1.92	1.68
Cement-rock quarries	3.96	3.48	2.99	3.95	1.60	2.38	2.99	2.14	2.66	2.75	1.91	2.27	1.67
Granite quarries	1.92	1.87	1.47	3.36	2.27	1.86	1.54	2.10	1.81	2.06	2.57	1.42	.90
Limestone quarries	2.21	2.19	2.13	2.38	1.70	2.36	1.79	1.79	1.97	2.58	1.97	1.87	1.87
Marble quarries	.71	2.48	1.81	2.72	1.00	1.16	.57	2.14	.51	.92	1.49	.43	.59
Sandstone and bluestone quarries	1.82	1.16	1.32	1.45	.93	1.28	.99	2.38	.76	.56	1.25	1.19	.48
Slate quarries	2.60	2.62	3.05	2.99	2.02	2.62	1.31	3.16	1.78	1.49	1.40	3.15	2.13
Trap-rock quarries	1.77	3.08	2.40	2.49	3.46	4.45	2.61	4.47	2.56	2.61	2.88	3.36	3.35
All quarries (excluding outside works)					2.17	2.32	2.00	2.19	2.29	2.81	2.22	2.31	1.97
All quarries (outside works only)					1.05	2.15	1.53	1.98	1.34	1.59	1.68	1.38	1.26
Metallurgical plants:													
Ore-dressing plants			.99	1.51	1.57	1.41	1.93	1.55	1.48	1.25	.50	1.09	1.55
Smelters			1.93	1.02	1.05	.73	1.05	.92	1.09	.66	.99	.77	.64
Auxiliary works					.89	.94	.85	.31	1.08	1.08	1.21	.94	
All coke ovens			1.97	2.12	1.21	1.32	2.14	2.06	1.92	1.64	1.23	1.59	1.76
Beehive coke ovens					.65	1.29	1.30	1.16	.92	1.09	1.76	1.66	1.68
By-product coke ovens					1.75	1.35	3.13	2.84	2.55	1.92	1.09	1.57	1.79

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TABLE 24.—*United States: Number of men injured per 1,000 300-day workers employed in mineral industries*

	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923
Coal mines													
All metal mines	170.27	190.11	179.59	211.87	248.56	250.64	240.97	237.09	233.60	242.02	249.68	268.48	265.18
Copper mines	225.25	258.42	230.80	312.19	322.01	319.58	313.35	322.12	309.60	323.20	317.53	320.78	349.09
Gold and miscellaneous metal mines	80.33	93.04	70.37	126.90	201.49	190.79	172.51	185.18	191.29	204.82	225.46	260.29	298.87
Iron mines	252.30	241.81	268.31	224.07	233.51	240.17	227.54	185.45	202.35	200.49	210.91	177.44	133.44
Lead and zinc mines (Mississippi Valley)	139.40	158.29	133.51	189.01	238.27	263.09	272.99	319.54	292.28	327.97	379.67	464.23	495.65
Nonmetallic mineral mines	34.03	66.40	84.86	99.75	107.78	144.70	123.58	104.69	139.27	161.88	215.47	247.51	211.47
All quarries (including outside works)	63.85	69.82	88.81	114.92	117.30	175.62	185.14	147.07	144.20	145.51	174.54	171.93	176.04
Cement-rock quarries	136.52	139.59	207.99	226.20	148.25	248.83	277.73	238.65	231.58	182.49	213.50	191.08	213.71
Granite quarries	53.07	44.87	69.60	109.21	96.72	143.99	189.73	109.68	124.70	130.53	134.09	147.21	177.99
Limestone quarries	67.99	79.98	89.05	114.23	127.43	176.10	175.52	141.34	134.05	143.11	178.54	177.72	169.31
Marble quarries	43.39	42.35	68.67	121.31	93.80	125.20	100.20	58.02	75.26	91.98	100.87	127.76	127.88
Sandstone and bluestone quarries	34.68	45.26	74.36	69.08	66.56	127.86	118.89	148.04	131.96	100.56	156.22	100.63	119.42
Slate quarries	17.72	15.01	18.81	28.61	33.08	85.00	112.04	96.29	98.51	108.20	135.18	127.40	149.11
Trap-rock quarries	69.76	68.89	87.77	152.56	232.85	237.84	222.92	205.17	186.47	208.89	229.92	258.01	228.47
All quarries (excluding outside works)					127.57	158.63	162.95	148.29	146.65	139.62	167.09	177.16	178.11
All quarries (outside works only)					96.90	206.06	223.81	145.03	140.28	154.04	185.79	164.76	173.05
Metallurgical plants:													
Ore-dressing plants			122.38	94.19	109.65	135.66	121.12	139.54	122.21	156.07	151.05	179.51	168.44
Smelters			174.71	175.44	157.69	195.61	152.88	148.40	141.46	136.37	149.89	143.71	130.71
Auxiliary works						142.10	169.33	139.63	101.29	113.92	138.54	120.26	132.37
All coke ovens			107.73	103.06	90.78	153.49	188.59	219.64	145.66	114.13	133.62	93.77	101.18
Beehive coke ovens					39.84	100.37	94.43	131.11	125.96	102.54	118.52	98.28	122.48
By-product coke ovens					140.00	217.09	300.06	296.06	158.33	120.04	137.50	92.15	92.95

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